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Management of intestinal intussusception in adults

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Abstract
Aim: Intussusceptions are rare conditions in adults. Therefore, there are no studies in the literature with large patient series. The debate on the treatment algorithms for the condition has continued. This condition generally occurs due to pathological causes in adults, and absence of clinical indications specific to it could lead to delays in diagnosis and treatment. In the present study, underlying etiological factors, diagnostic methods, and alternative treatment modalities for intussusceptions were discussed in the light of the literature.
Material and Methods: In the present study, data of 11 patients with mechanical intestinal obstruction complaint who were operated and who had diagnosis of intestinal intussusception from January 2016 to August 2019 in Bagcilar Training and Research Hospital General Surgery Clinic were evaluated retrospectively.
Results: The mean age of the 11 patients included (six men and five women) was 43.9 years (range 19-87). All patients were operated due to mechanical obstruction. Nine patients had enteroenteric intussusception (one malign and eight benign) while two patients had ileocolic intussusception (malign). Three cases had enterotomy, five cases had a segmental small bowel resection, and two cases had hemicolectomy.
Discussion: Intussusception is a rare cause of mechanic clinical obstructions in adults, and preoperative diagnosis is still difficult. Frequently used treatment is resection and anastomosis. Debates about deinvaginations have been continuing.

Keywords
Small intestine; Intussusception; Intestinal obstruction

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Introduction

Intussusceptions or invaginations are defined as sliding of a part of the gastrointestinal system into the distal segment following it. Development of intussusception could result in obstruction in the lumen, impaired blood flow, ischemia, and necrosis. In childhood, intussusceptions are frequent clinical conditions and 95% of them arise due to idiopathic causes [1]. In adulthood, on the other hand, intussusceptions constitute about 1% of etiological causes in intestinal obstructions while 90% of them occur as a result of pathological causes. Tumors are responsible for 60-65% of these pathologies [1]. In 80% of pediatric cases, pneumatic or hydrostatic reduction is sufficient for the treatment of the condition. In adults, on the other hand, the use of reduction is controversial and mostly requires resection [1, 2]. In adult cases, there are no specific symptoms indicative of intussusceptions, and apparent symptoms could be confused for intestinal obstruction findings. Therefore, unlike children, diagnosis is difficult in adults and is mostly confirmed during the operation [3].

In the present study, adult intestinal intussusception cases presented to our clinic were studied retrospectively with an aim of obtaining new information regarding the causes, diagnosis, and treatment of the disease.

Material and Methods

Data of 11 patients with mechanical intestinal obstruction complaint who were operated during the period of January 2016-August 2019 in Bagcilar Training and Research Hospital General Surgery Clinic and who had intestinal intussusception diagnosis were evaluated retrospectively. Demographic data such as age and gender as well as clinical data such as department where they had their diagnoses, symptoms, complementary test findings, preliminary diagnoses, applied treatments, etiologies, location of the head of the invagination, follow-up findings and complications were evaluated. This study was approved by the Institutional Review Board of Bagcilar Training and Research Hospital, and it was conducted according to the principles of the Helsinki Declaration. Written consent could not be taken from the patients due to the retrospective design of the study.

Three types of intussusceptions were considered separately and further divided: i.e. enteric intussusception where intussusception was located in the small bowel alone (jejunojejunal, jejunoileal and ileoileal); ileocolic intussusception where intussusception involved both small bowel and large bowel at the same time; and colocolic intussusception where intussusception involved any part of the colon. Etiologies of the lesions were also classified especially in terms of the benign or malignant nature of lead point for the intussusception.

Data with normal distribution were given as mean ± standard deviation. Patient characteristics were presented as number (n) and percentage (%). Statistical evaluation of data was performed using Statistical Package for Social Sciences (SPSS) software (ver. 20.0, SPSS Inc., Chicago, IL).

Results

The mean age of the 11 patients (six men and five women) included in the study was 43.9 years (range 19-87). All patients had surgical operation due to mechanical intestinal obstruction complaint. Nine patients had no feature in their backgrounds while two had diagnosis of Peutz-Jeghers syndrome. In the preoperative period, nine patients had computed tomography (CT) based diagnosis while two were diagnosed with ultrasonography. Six patients had preoperative intussusception diagnosis, whereas five patients with mechanical intestinal obstruction were operated after preliminary diagnosis. For three patients, laparoscopic treatment was preferred, and a median incision was used in eight patients. In nine patients, enteric intussusception was observed (1 jejunojejunal, 6 jejunoileal, and 2 ileoileal), whereas two were found to have ileocolic intussusception. During the surgery, pedunculated polyps were excised with enterotomy in three patients in which isolated polypoid lesion was observed in the etiology, and Meckel diverticulum excision was performed in one patient. Small bowel resection was carried out in four patients who had multiple polyps as etiological cause and in one patient who had Meckel diverticulum intussusception since the malignancy could not be ruled out in these patients. On the other hand, right hemicolectomy was performed in two patients who were considered to have malignancy (Table 1).

Table 1. General Characteristics of the Patients

Patient	Age	Localization of intussusception	Etiological cause	Bening or malign	Accompanying disorder	Applied surgical treatment
1	29	Enteroenteric	Hamartomatous polyp	Benign	-	Enterotomy
2	69	Enteroenteric	Inflammatory pseudopolyp	Benign	-	Enterotomy
3	49	Enteroenteric	Inflammatory fibroid polyp	Benign	-	Enterotomy
4	21	Enteroenteric	Meckel diverticulum	Benign	-	Meckel diverticulum excision
5	37	Enteroenteric	Hamartomatous polyp	Benign	Peutz-Jeghers syndrome	Segmental small bowel resection
6	54	Enteroenteric	Hamartomatous polyp	Benign	Peutz-Jeghers syndrome	Segmental small bowel resection
7	47	Enteroenteric	Inflammatory pseudopolyp	Benign	Crohn disease	Segmental small bowel resection
8	27	Enteroenteric	Meckel diverticulum	Benign	-	Segmental small bowel resection
9	19	Enteroenteric	Lymphoma	Malign	-	Segmental small bowel resection
10	45	Ileocolic	Lymphoma	Malign	-	Right hemicolectomy
11	87	Ileocolic	Adenocarcinoma	Malign	-	Right hemicolectomy

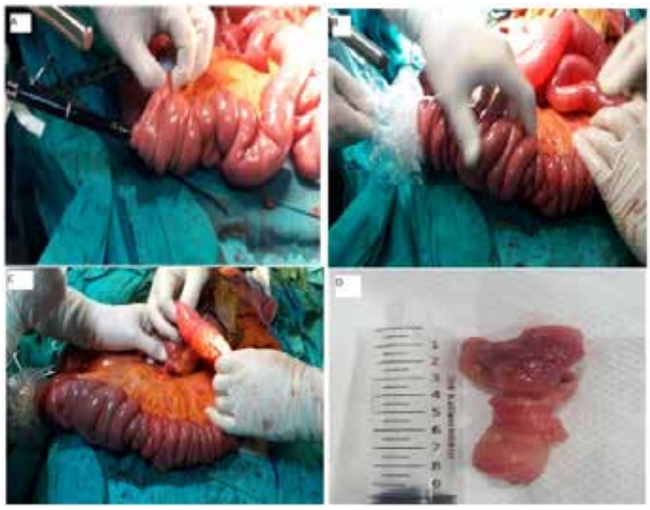

Figure 1. (a, b, c, d): Performing polypectomy with the help of snare entering via enterotomy through gastroscopy in a case with Peutz-Jeghers syndrome (Table 1, Case 6).

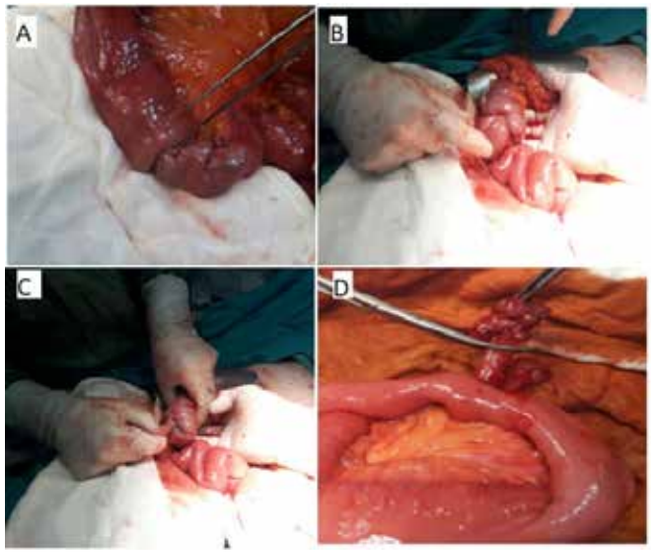

Figure 2. (a, b, c, d): Enteroenteric intussusceptions which developed in polyp background.

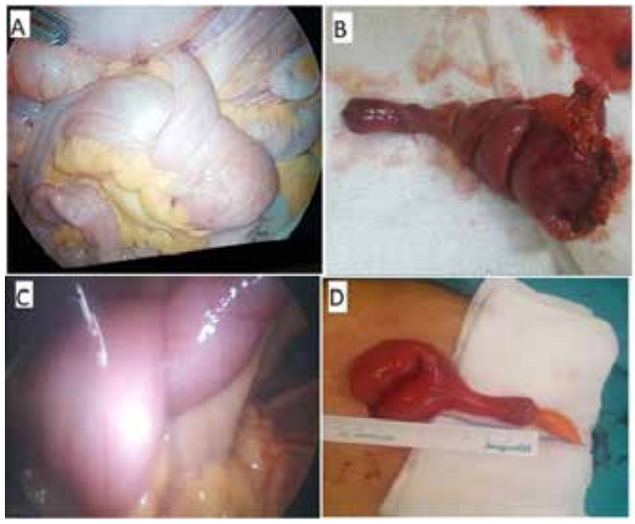

Figure 3. (a, b): Intussusception which occurred depending upon Meckel diverticulum and segmental small bowel resection (Table 1, Case 8). **(c, d)**: Meckel diverticulum after the development of intussusception which occurred depending upon it (Table 1, Case 4).

Discussion

First described in 1962 by Barbette, intussusception is a condition especially common in children under two years of age. It is among the rare causes of mechanic intestinal obstruction in adults. The etiology of intussusception is different in children and adults. Infantile intussusceptions constitute more than 80% of mechanic intestinal obstructions in the infantile period. In more than 90% of these cases, the etiological cause is lymphadenopathy which develops secondary to adenovirus infection, or there is no etiology at all [3, 4]. On the other hand, enteric or colonic pathologies are responsible in 90% of adult intussusceptions [2]. The causes are lymphoma, nodular lymphoid hyperplasia, polyp, lipoma, or hamartoma in the small bowel, while the most common cause in the colon is tumors. In general, 60-65% of all cases in adults are caused by tumors [2, 5]. In the present study, one out of nine enteroenteric intussusceptions was due to malignancy (lymphoma), while the other eight was of benign origin. The two cases which caused ileocolic intussusception involved malignancy. No intussusception case due to idiopathic causes was observed in the present study (Table 1).

Intussusception in children is mostly in ileocolic form. In adults, it could be in enteroenteric, ileocolic, and colocolic form [3]. Two of our cases were ileocolic intussusceptions and nine were in the form of enteroenteric intussusception. In children, the major symptoms of intussusception are stomachache, palpable mass in the abdomen, and currant-jelly-like bloody stools. No specific symptoms exist in adults. The diagnosis is usually made at laparotomy [6]. In our series, a preoperative clinical indication of the cases was dominated by mechanic obstruction symptoms such as nausea, vomiting, and distension in the abdomen. Bloody stool was not observed in any patients in the preoperative period.

Ultrasonography is a commonly used method in the diagnosis of intussusceptions. Pseudokidney appearance in the sagittal plane examination and target or bull's eye appearances in the transverse plane are evaluated in favor of intussusceptions. Accuracy of diagnosis in USG varies from 30 to 55% depending upon the experience of the physician [7, 8, 9]. In USG, excess amount of feces in colon, malrotation in perforated Meckel diverticulum, and the presence of hematoma inside the abdomen could lead to artifacts [1]. In addition, the sensitivity of USG is lower in cases where obstruction developed [10]. Computed tomography (CT), on the other hand, achieves a diagnostic accuracy of 58-100% for intussusceptions [8]. In addition, CT could provide sufficient information about the location of the mass, its association with the surrounding tissues, metastasis, lymphadenopathy, free liquid, and proximal bowel dilatation [1]. Therefore, CT is much more commonly used than USG in the diagnosis of intussusceptions. In our two cases, intussusception diagnosis was made in the preoperative period with USG while four cases had a diagnosis with CT examination in the preoperative period. In the remaining five cases, the diagnosis was made during laparotomy.

Due to frequent anatomic anomalies and high malignancy frequency in intussusceptions, most surgeons consider surgical intervention as a necessity in their treatment [7, 11]. Unlike child intussusceptions of benign origins, preoperative

reduction using barium or air is not a treatment option in adults [6, 12]. Preliminary manipulation and reduction of an invaginated bowel have some theoretical risks of intraluminal tumor dissemination, spreading microorganisms and tumor cells into the peritoneal cavity and anastomosis complications in bowel tissue [12]. When signs of inflammation or ischemia were observed on the bowel wall [13], the reduction should be avoided. Thus, in patients with a higher incidence of bowel malignancy such as the patients over 60 years of age with ileocolic and colocolic intussusceptions, formal resections are recommended where the primary anastomosis is constructed between healthy tissues using appropriate oncologic techniques. It was reported that reduction and limited resection resulted in the healing of intussusception without recurrence in enteric intussusceptions of benign origin [14]. A combination of limited intestinal resection and multiple snare polypectomies could be necessary when a patient had risk of a short bowel syndrome due to multiple intestinal polyps as in Peutz-Jeghers syndrome [15] (Figures 1a-d).

Upon observing that the development of intussusception was due to pedunculated polyp in three cases of enteroenteric origin, polypectomy and enterotomy were practiced (Figures 2a-d). Meckel diverticula excision was applied to one case (Figures 3c, d) while five cases had small bowel segmental resection since malignancy could not be ruled out (Figures 3a, b). Due to the high number of polyps in two cases with Peutz-Jeghers syndrome, polypectomy was applied intraoperatively to pedunculated polyps using snare through entering with gastroscope from the area where enterotomy was performed. Thus, it was possible to keep small bowel resection limited (Figures 2a-d). In two cases with ileocolic intussusception, right hemicolectomy was performed since the obstruction was caused by an apparent malignancy (Table 1).

Conclusion

Intussusception is a rare clinical condition in adults and its symptoms may be weak. Diagnosis is difficult in the preoperative period due to a lack of symptoms. Abdominal CT is the most sensitive radiological examination for intussusception. Since most intussusceptions in adulthood involve malignancy, surgery is the main treatment modality. Wedge resection is performed when the malignancy could be ruled out while segmental resection is the method of choice if malignancy is suspected.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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